2018 Commission Officers:

Chair – Dr. Eric Sandvol, Columbia
Vice-Chair – Dr. Brent Rosenblad, Columbia

Commission Website:

http://mssc.missouri.edu/

June 7, 2019

Honorable Michael L. Parsons
Governor
State of Missouri

MSSC 2018 Report on the State of Missouri's Earthquake Preparedness for Major Earthquakes

Dear Governor Parsons:

In 1995, the Missouri Seismic Safety Commission (MSSC) was established, consisting of 17 members -- 15 appointed professionals from architecture, planning, fire protection, public utilities, electrical engineering, mechanical engineering, structural engineering, soils engineering, geology, seismology, local government, insurance, business, the American Red Cross and emergency management, one Missouri House appointed member and one Missouri Senate appointed member to work with various levels of government to help Missourians take steps to prepare for and reduce the effects of an earthquake. The mission of the MSSC is to review Missouri's current preparedness for major earthquakes and to make recommendations to mitigate their impact. This report summarizes the activities conducted by Commission's Members during 2018 in executing that mission.

Missouri Seismic Safety Commissioners volunteer to serve until replaced by newly appointed representatives. We would like to thank the Governor's office for helping to reappointment our commissioners so that most of the MSSC no longer has expired terms. The following is a list of currently serving commissioners – as you can see, there are still a number of vacant positions:

Representing	Name	Term Ends
Electrical Engineering	Dr. Philip Gould, PE	Term Expired July 1, 2012
Fire Protection	Mr. John Mallott	Term Expires July 1, 2020
Insurance	Mr. Joe Green	Term Expired July 1, 2012
Local Government	Mr. Joel P. Evans	Term Expires July 1, 2020
Public Utilities	Mr. Daryl Sorrell	Term Expires July 1, 2022

Seismology	Dr. Eric Sandvol	Term Expires July 1, 2020
Soils Engineering	Dr. Raymond Bailey, RG, PE	Term Expires July 1, 2020
Planning	Vacant	
Soils Engineering	Dr. Brent Rosenblad	Term Expires July 1, 2022
Public Education	Vacant	
Mechanical Engineering	Vacant	
American Red Cross	Vacant	
Geology	Vacant	
Business	Vacant	
Emergency Management	Vacant	
House Appointed Member	Rep. Holly Rehder	
Senate Appointed Member	Sen. Doug Libla	

The State of Missouri has taken important steps to prepare for and reduce the effects of a major earthquake as reflected in the Strategic Plan for Earthquake Safety in Missouri, first published by the MSSC in 2007. The report presented below summarizes the activities of the commission during 2018 in the continued implementation and support of this plan and highlights the current preparedness efforts to mitigate the effects of a major earthquake.

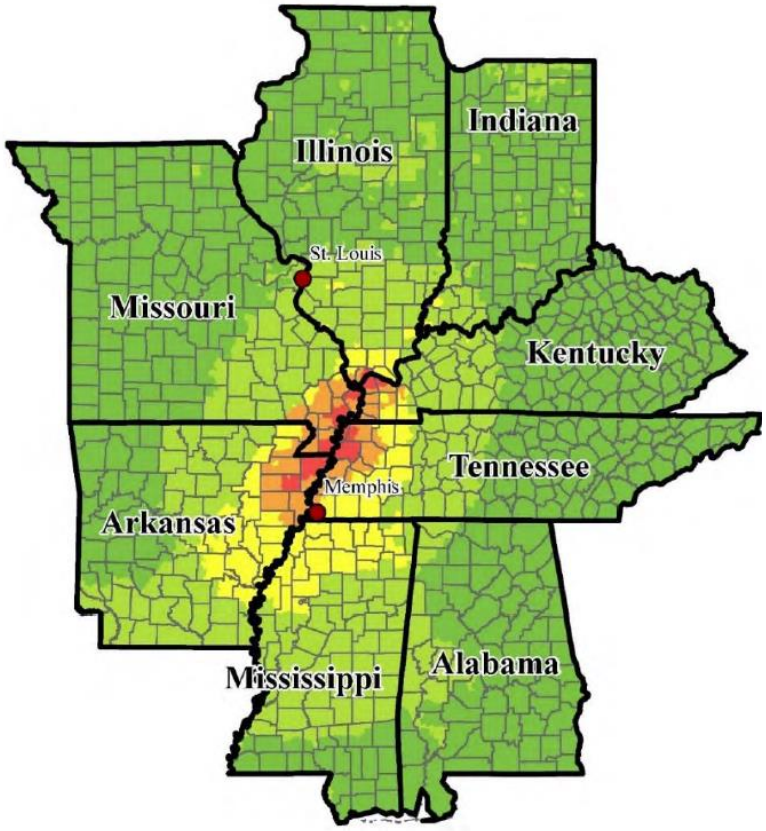

Figure 1. The sequence of three large earthquakes in the New Madrid Seismic Zone (NMSZ) generate strong ground shaking across 8 states in the central U.S. The red regions in this map are the regions of the strongest ground shaking between 1811 and 1812. Modified from FEMA's NMSZ Earthquake IOP.

Past earthquakes have caused great damage in the central region of the United States, and there is broad agreement in the scientific community that there is a continuing concern for a major earthquake that would put structures and communities in Saint Louis and southeast Missouri vulnerable to damage from severe ground shaking. An open file report from the United States Geological Survey has reaffirmed that there is significant reason to plan for a significant seismic event in the New Madrid Seismic Zone.

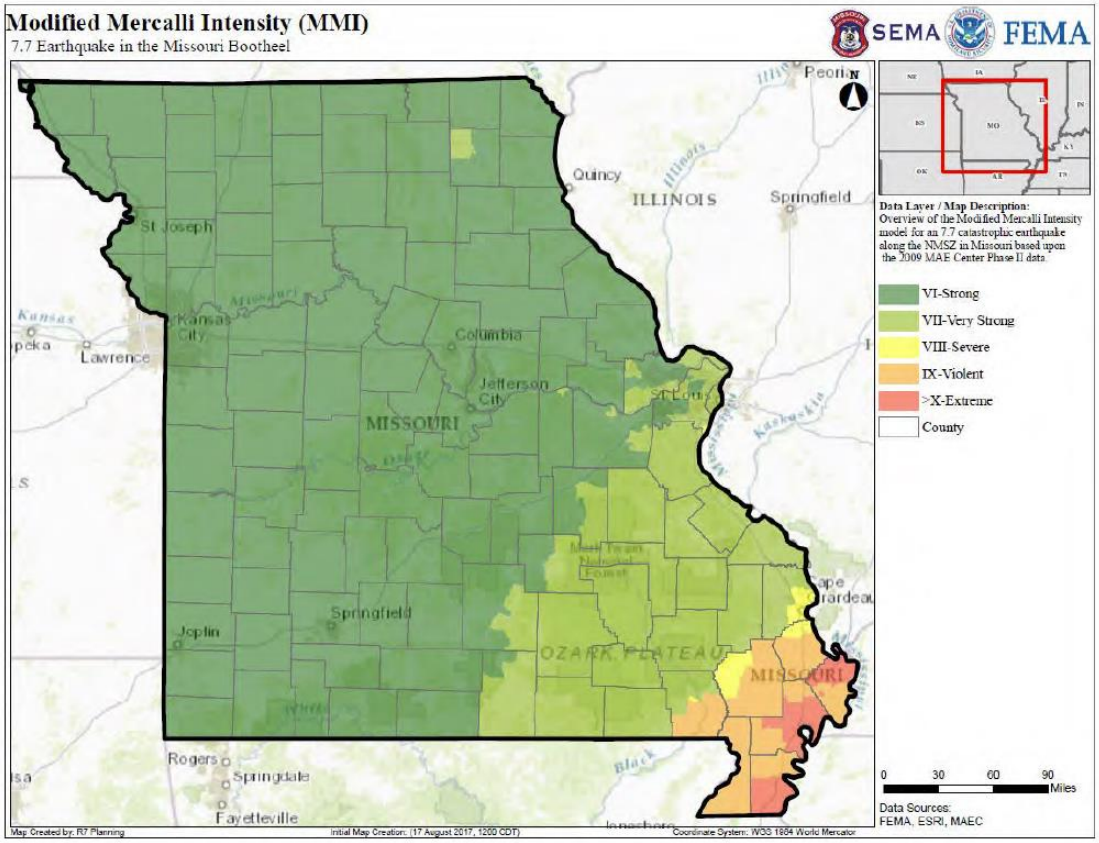

Figure 2. A plot of modified Mercali Intensities for a M 7.7 in southeast Missouri from the Federal Emergency Management Agency. The largest intensity (largest ground shaking) is shown in red.

MSSC RVS Program

The Missouri Seismic Safety Commission is leading a very important program to improve earthquake safety and readiness in Missouri schools. The Commission works with structural engineers, architects, and construction professionals to conduct "rapid visual screenings" for potential seismic hazards of school buildings. These screenings:

- Are provided free of charge to participating school districts
- Help determine earthquake-readiness of school buildings and district facilities
- Provide preliminary recommendations to improve school safety
- Can be used to prioritize structural retrofit or non-structural improvements
- Use FEMA-approved methodology known as "FEMA P-154"

The earthquake threat to Missouri cannot be ignored. The Strategic Plan for Earthquakes in Missouri developed tangible, practical recommendations and procedures to prepare Missouri for future earthquakes as well as other hazards, such as tornadoes and strong storms, at the same time. This consisted of Five Objectives with specific implementation strategies. MSSC commissioners met once each quarter to evaluate current progress in achieving the goals as indicated below.

Objective 1: Increase Earthquake Awareness and Education

Strategy 1.1 - Promote Awareness among the general public.

- February was Earthquake Awareness Month in Missouri, highlighted by presentations, media coverage, social media activities and demonstrations through the state.
- 10/16 Rapid Visual Screening program highlighted on KFVS-TV report on seismic readiness of schools in southeast Missouri
- 09/22 Rocks, Quakes, and Fossils at the St. Louis Science Center. The MSSC had a display for families to learn how earthquakes work. Over 3,000 people visited the science center that day.
- 11/10 Forces of Nature at Rockbridge High School in Columbia MO. The MSSC had display for families to learn how earthquakes work. Approximately 700 people visited the MSSC booth for this event.
- Revamped the MSSC website (http://mssc.missouri.edu/) providing Missourians access to earthquake information and updates on disaster preparedness. Specifically we added a section about our RVS program. We completely re-organized the site to update bylaws. The site provides information to the public about the activities of the MSSC as well as links to latest earthquake information and disaster preparedness. The web site was updated over the course of the year.
- 10/18 The Great Central U.S. ShakeOut earthquake drills was held throughout the region, with more than 500,000 registered participants in Missouri.

Figure 3. Example of a field report and team from the MSSC's Rapid Visual Screening program.

Strategy 1.2 - Promote Awareness among key professionals in critical fields.

- 4/18 Chairman met with the Missouri Geologists Consortium in order to discuss how to make the MSSC more effective and appoint new commissioners
- 10/18 As part of the ShakeOut earthquake drill, Jeff Briggs conducted two media events, one at an Patrick Henry Elementary School in St. Louis and one at an emergency managers meeting in Sikeston.

- The MSSC has worked with EERI (The Earthquake Engineering Research Institute) to develop a series of slides on Earthquake preparedness for the State to give to key decision makers in the state.

Strategy 1.3 - Promote Awareness among K-12 students.

- 4/17 MSSC chair participated in Science Sleuth Saturday along with graduate students from the University of Missouri (*worked with approximately 200 students*)
- 6/20 Chairman participated in the Missouri Scholar's Academy (*18 high school students from around the state*)
- Sponsored exhibit booth with earthquake awareness information at SEMO District Fair in Cape Girardeau in September.

Objective 2: Reduce Earthquake Hazard Through Mitigation

Strategy 2.1 - Promote adoption/enforcement of technically sound & feasible building codes.

- Monitored and offered support for the establishment of local building standards.

Strategy 2.2 – Identify existing essential facilities and schools susceptible to EQ damage.

- The MSSC continued its study using volunteers to conduct a Rapid Visualization Screening (RVS) that reported on the vulnerability of school facilities to failure in a seismic or high wind event (Figure 3). The study identified the vulnerability of a majority of the older school facilities in the southeastern region of Missouri, noted inexpensive corrections that should reduce school children's and staff person's morbidity and mortality from future earthquakes, and recommended that the school districts in the 46 counties and City of Saint Louis that are considered to be "at risk" from a major earthquake request an enhanced Rapid Visual Assessment (RVA) screening under the auspices of MSSC using volunteer professionals provided by professional societies or contract for an evaluation by a qualified engineer.
- 3/23 Rapid Visual Screening volunteer inspector training, St. Louis. About 30 participants in this commission-sponsored training for school structural inspections.
- 5/4 Rapid Visual Screening presentation at national earthquake conference in Long Beach, California. MSSC's contractor presented program and results at this national conference as an example of a program making an impact in a high seismic zone.
- Four schools districts were screened; Chaffee R-II, Portageville, Blair Oaks and Wellsville-Middletown R-1. Extensive reports for all three school districts were generated as a result of the visit.
- The MSSC commissioners conducted follow up visits for prior RVS visits and reports. The visits are designed to monitor and encourage mitigation efforts at the Schools that we have conducted a RVS visit and generated an extensive report. These visits also help the MSSC to understand how to better aid school districts in preparing for major seismic events.

Objective 4: Improve Recovery

Strategy 4.3 – Promote funding and training of post-earthquake building inspection.

- MSSC received FEMA funds to support travel expenses for volunteers and support staff to coordinate the assignment of teams to conduct Rapid Visual Assessment (RVA) screening evaluations and training for team leaders.
- MSSC revised strategic planning including efforts to help improve recovery efforts after a major earthquake

Major earthquakes in the central US are rare, but can affect a large geographical area, challenging the state resources to respond. The lessons learned from past U.S. earthquakes have demonstrated the significant burden placed on surviving families, businesses, utilities and state agencies. Preparation in the short term will yield significant reductions in fatalities, casualties, damaged structures, business failures, and state infrastructure losses from earthquakes. The same actions will also reduce the impact of other natural hazards. The MSSC will endeavor to continue making progress towards achieving the objectives presented in the Strategic Plan for Earthquake Safety during the next twelve months.

Respectfully submitted,

Eric Sandvol, Ph.D.
2018 Chairman, Missouri Seismic Safety Commission